

# Dual Non-Inverting Power Driver

## FEATURES

- 3.0A Peak Current Totem Pole Output
- 5 to 35V Operation
- 25ns Rise and Fall Times
- 25ns Propagation Delays
- Thermal Shutdown and Under-Voltage Protection
- High-Speed, Power MOSFET Compatible
- Efficient High Frequency Operation
- Low Cross-Conduction Current Spike
- Enable and Shutdown Functions
- Wide Input Voltage Range
- ESD Protection to 2kV

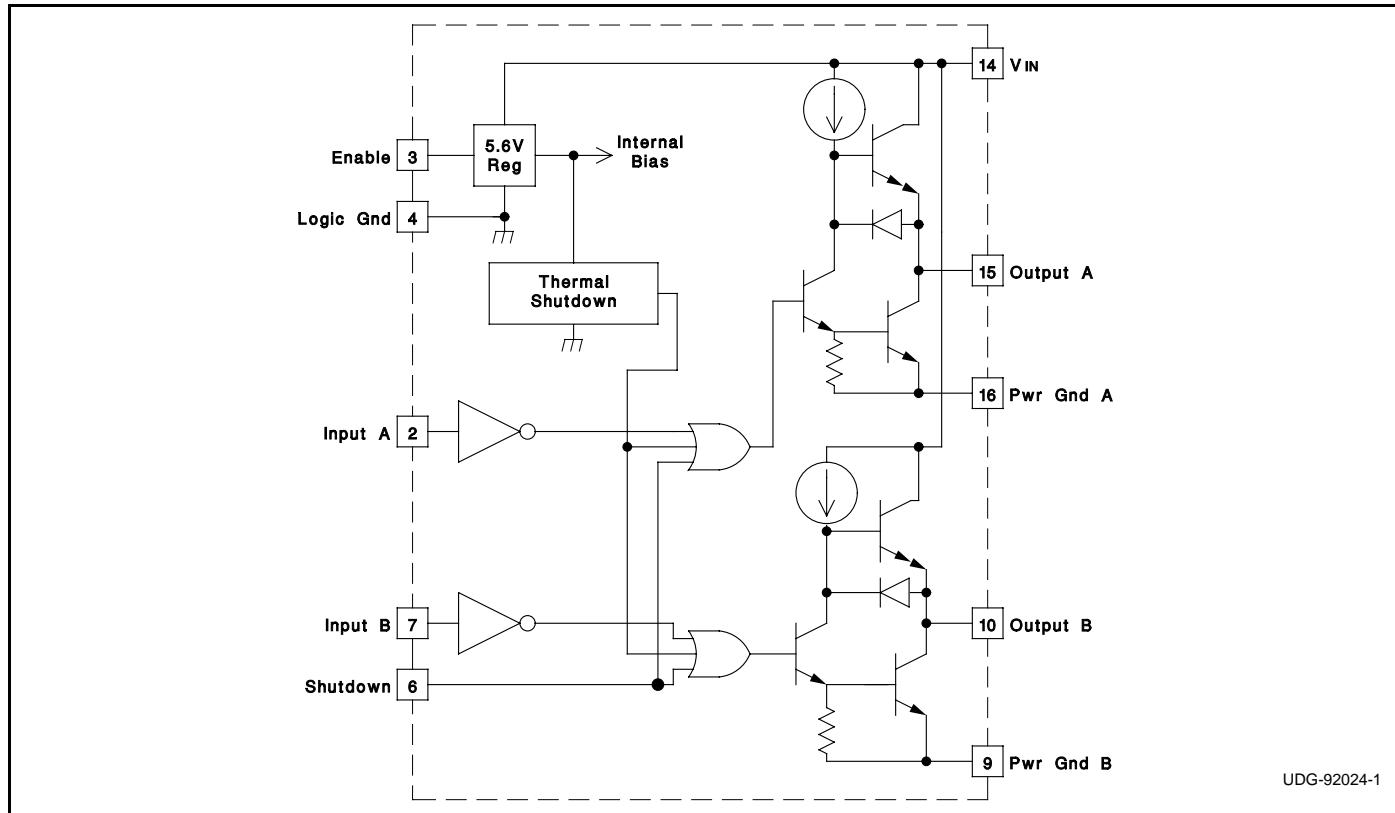
## DESCRIPTION

The UC1708 family of power drivers is made with a high-speed, high-voltage, Schottky process to interface control functions and high-power switching devices – particularly power MOSFETs. Operating over a 5 to 35 volt supply range, these devices contain two independent channels. The A and B inputs are compatible with TTL and CMOS logic families, but can withstand input voltages as high as  $V_{IN}$ . Each output can source or sink up to 3A as long as power dissipation limits are not exceeded.

Although each output can be activated independently with its own inputs, they can be forced low in common through the action of either a digital high signal at the Shutdown terminal or by forcing the Enable terminal low. The Shutdown terminal will only force the outputs low, it will not effect the behavior of the rest of the device. The Enable terminal effectively places the device in under-voltage lockout, reducing power consumption by as much as 90%. During under-voltage and disable (Enable terminal forced low) conditions, the outputs are held in a self-biasing, low-voltage, state.

The UC3708 and UC2708 are available in plastic 8-pin MINIDIP and 16-pin "bat-wing" DIP packages for commercial operation over a  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  temperature range and industrial temperature range of  $-25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  respectively. For operation over a  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range, the UC1708 is available in hermetically sealed 8-pin MINIDIP and 16 pin DIP packages. Surface mount devices are also available.

## BLOCK DIAGRAM



Note: Shutdown feature available only in JE, NE or DW packages.

### ABSOLUTE MAXIMUM RATINGS (Note 1)

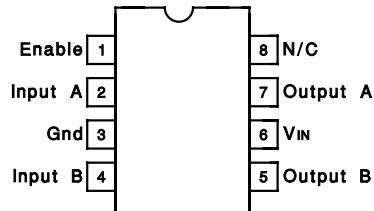
Supply Voltage $V_{IN}$ .....	35V
Output Current (Each Output, Source or Sink)	
Steady-State .....	0.5A
Peak Transient .....	3A
Output Voltage .....	-0.3 to ( $V_{IN} + 0.3$ )V
Enable and Shutdown Inputs .....	-0.3 to 6.2V
A and B Inputs .....	-0.3 to ( $V_{IN} + 0.3$ )V
Operating Junction Temperature (Note 2) .....	150°C
Storage Temperature Range .....	-65° to 150°C
Lead Temperature (Soldering, 10 Seconds) .....	300°C

NOTE 1: All voltages are with respect to Logic Gnd pin. All currents are positive into, negative out of, device terminals.

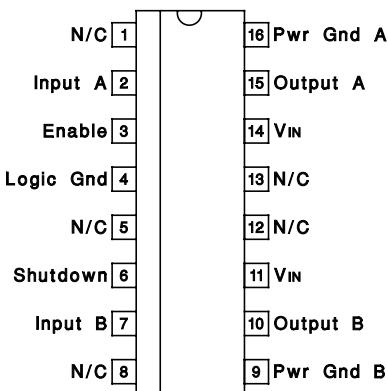
NOTE 2: Consult Unitrode Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

### CONNECTION DIAGRAMS

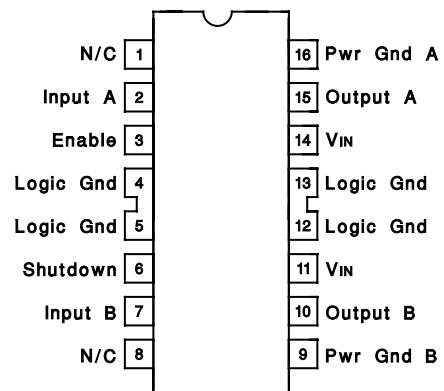
#### DIL-8 (Top View) J Or N Package



#### SOIC-16 (Top View) DW Package



#### DIL-16 (Top View) JE or NE Package



Note: In JE package Pin 4 is logic ground. Pins 5, 12, and 13 are N/C.

**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated,  $V_{IN}=10V$  to 35V, and these specifications apply for:  $-55^{\circ}C < T_A < 125^{\circ}C$  for the UC1708,  $-25^{\circ}C < T_A < +85^{\circ}C$  for the UC2708, and  $0^{\circ}C < T_A < 70^{\circ}C$  for the UC3708.  $T_A = T_J$ .

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IN}$ Supply Current	Outputs Low		18	26	mA
	Outputs High		14	18	mA
	Enable = 0V		1	4	mA
A, B and Shutdown Inputs Low Level				0.8	V
A, B and Shutdown Inputs High Level		2.0			V
A, B Input Current Low	$V_{A,B} = 0.4V$	-1	-0.6		mA
A, B Input Current High	$V_{A,B} = 2.4V$	-200		50	$\mu A$
A, B Input Leakage Current High	$V_{A,B} = 35.3V$			200	$\mu A$
Shutdown Input Current Low	$V_{SHUTDOWN} = 0.4V$		20	100	$\mu A$
Shutdown Input Current High	$V_{SHUTDOWN} = 2.4V$		170	500	$\mu A$
	$V_{SHUTDOWN} = 6.2V$		0.6	1.5	mA

**ELECTRICAL CHARACTERISTICS (cont.):** Unless otherwise stated,  $V_{IN} = 10V$  to  $35V$ , and these specifications apply for:  $-55^{\circ}C < TA < 125^{\circ}C$  for the UC1708,  $-25^{\circ}C < TA < +85^{\circ}C$  for the UC2708, and  $0^{\circ}C < TA < 70^{\circ}C$  for the UC3708.  $TA = TJ$ .

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Enable Input Current Low	$V_{ENABLE} = 0V$	-600	-460	200	$\mu A$
Enable Input Current High	$V_{ENABLE} = 6.2V$			200	$\mu A$
Enable Threshold Rising			2.8	3.6	V
Enable Threshold Falling		1.0	2.4	3.4	V
Output High Sat., $V_{IN} - V_{OUT}$	$I_{OUT} = -50mA$			2.0	V
	$I_{OUT} = -500mA$			2.5	V
Output Low Sat., $V_{OUT}$	$I_{OUT} = 50mA$			0.5	V
	$I_{OUT} = 500mA$			2.5	V
Thermal Shutdown			155		$^{\circ}C$

### SWITCHING CHARACTERISTICS (Figure 1) ( $V_{IN} = 20V$ , delays measured to 10% output change.)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
<b>From A,B Input to Output:</b>					
Rise Time Delay (TPLH)	$CL = 0pF$		25	40	ns
	$CL = 1000pF$ (Note 3)		25	40	ns
	$CL = 2200pF$		30	45	ns
10% to 90% Rise (TTLH)	$CL = 0pF$		55	75	ns
	$CL = 1000pF$ (Note 3)		25	50	ns
	$CL = 2200pF$		40	55	ns
Fall Time Delay (TPHL)	$CL = 0pF$		25	40	ns
	$CL = 1000pF$ (Note 3)		25	45	ns
	$CL = 2200pF$		35	50	ns
90% to 10% Fall (TTHL)	$CL = 0pF$		15	20	ns
	$CL = 1000pF$ (Note 3)		25	45	ns
	$CL = 2200pF$		40	55	ns
<b>From Shutdown Input to Output</b>					
Rise Time Delay (TPLH)	$CL = 0pF$		25	75	ns
	$CL = 1000pF$ (Note 3)		30	75	ns
	$CL = 2200pF$		35	75	ns
10% to 90% Rise (TTLH)	$CL = 0pF$		50	75	ns
	$CL = 1000pF$ (Note 3)		25	50	ns
	$CL = 2200pF$		40	55	ns
Fall Time Delay (TPHL)	$CL = 0pF$		25	45	ns
	$CL = 1000pF$ (Note 3)		30	50	ns
	$CL = 2200pF$		35	55	ns
90% to 10% Fall (TTHL)	$CL = 0pF$		25	20	ns
	$CL = 1000pF$ (Note 3)		25	45	ns
	$CL = 2200pF$		40	55	ns
Total Supply Current	$F = 200kHz$ , 50% duty cycle, both channels; $CL = 0pF$		23	25	mA
	$F = 200kHz$ , 50% duty cycle, both channels; $CL = 2200pF$		38	45	mA

**NOTE 3:** These parameters, specified at  $1000pF$ , although guaranteed over recommended operating conditions, are not tested in production.

Figure 1: AC Test Circuit and Switching Time Waveforms

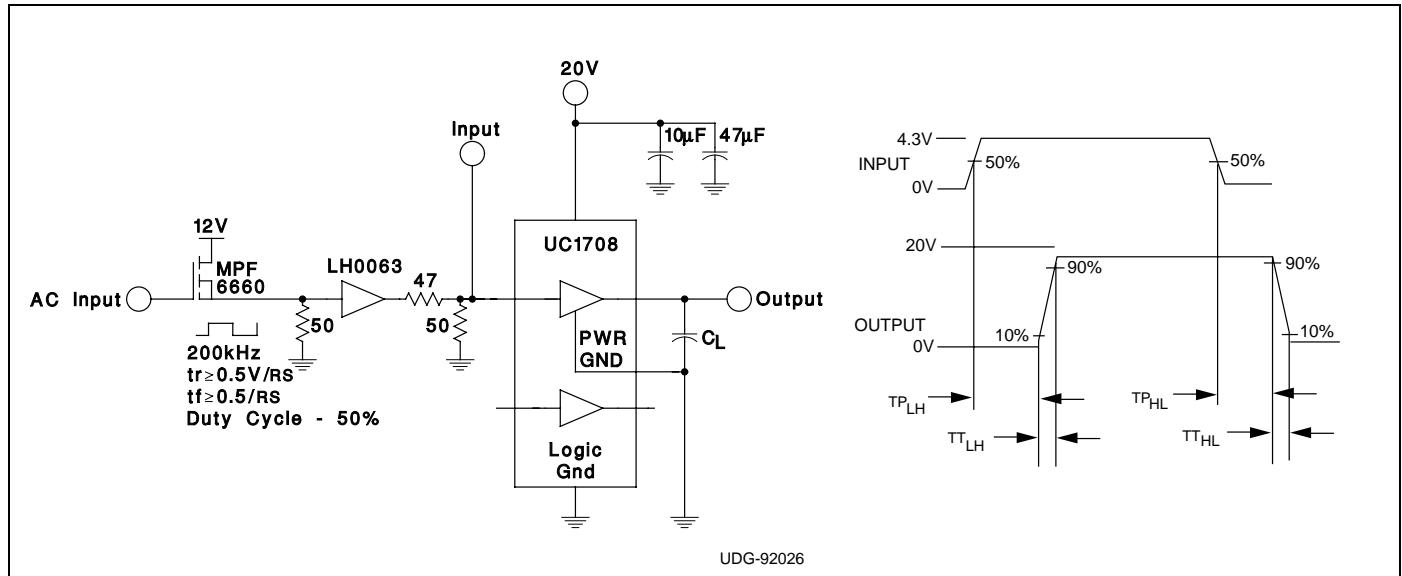
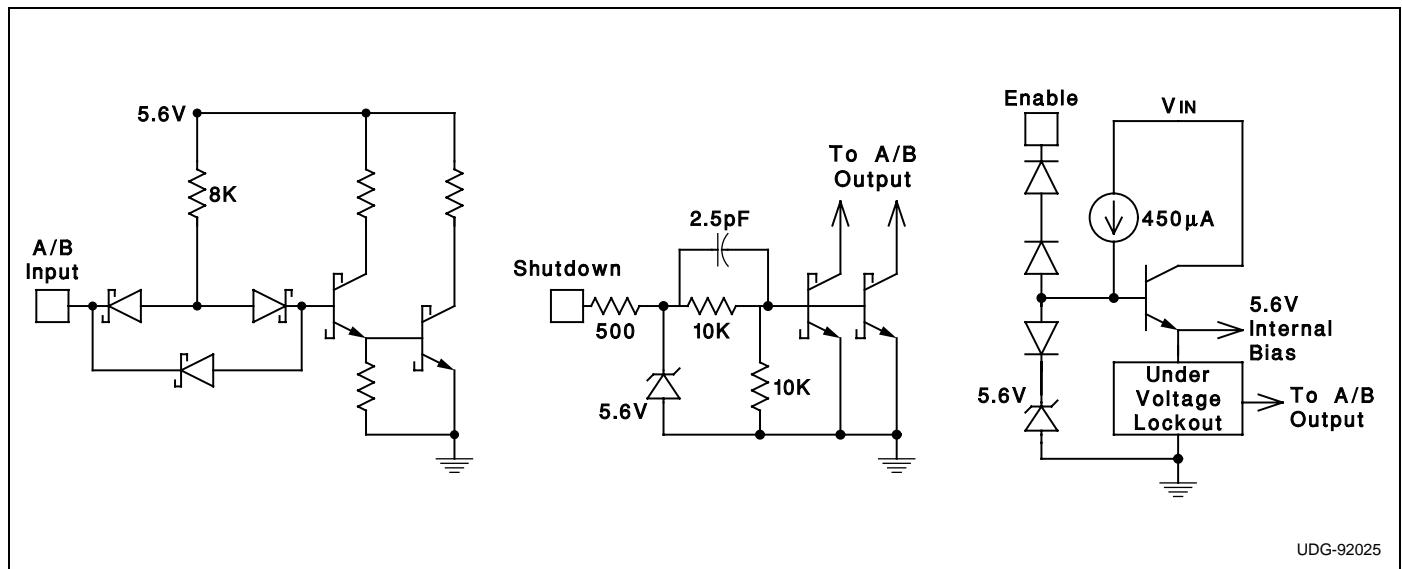


Figure 2: Equivalent Input Circuits



Note: Shutdown feature available only in JE, NE or DW Packages.

### **IMPORTANT NOTICE**

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.

Copyright © 1999, Texas Instruments Incorporated